

# LRO Educator Resources Kit Standards/Benchmarks Alignment

	Timeline of Lunar Exploration	Mapping the Surface of the Moon	Lunar Image Analysis	Question Moon	Exploring the Moon through Image Analysis	Making a 3D Model of the Moon's Surface	Making a Model	Planning a Mission to the Lunar South Pole	Lunar Image Processing with GIMP	Lunar Laser Altimetry: Studying the Topography of the Moon	Learning about Light	Seeing in the Dark	Using Radar to Search the Darkness	CRaTER	How to Detect Cosmic Rays	How Cosmic Rays Affect Humans	The Discovery and Nature of Cosmic Rays
<b>AAAS Benchmarks</b>																	
<b>1B/1:</b> Scientific investigations usually involve the collection of relevant evidence, the use of logical reasoning, and the application of imagination in devising hypotheses and explanations to make sense of the collected evidence.		+	+	+	+	+	+		+	+	+	+	+	+	+	+	+
<b>3A/M2:</b> Technology is essential to science for such purposes as access to outer space and other remote locations, sample collection and treatment, measurement, data collection and storage, computation, and communication of information.	+	+	+	+	+	+	+		+	+			+	+	+	+	+
<b>4A/H3:</b> Increasingly sophisticated technology is used to learn about the universe. Visual, radio, and X-ray telescopes collect information from across the entire spectrum of electromagnetic waves; computers handle data and complicated computations to interpret them; space probes send back data and materials from remote parts of the solar system; and accelerators give sub-atomic particles energies that simulate conditions in the stars and in the early history of the universe before stars formed.								+									

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<b>12E/H4:</b> Insist that the key assumptions and reasoning in any argument—whether one's own or that of others—be made explicit; analyze the arguments for flawed assumptions, flawed reasoning, or both; and be critical of the claims if any flaws in the argument are found.								+									
<b>12A/H1:</b> Exhibit traits such as curiosity, honesty, openness, and skepticism when making investigations, and value those traits in others.								+									
<b>F/5:</b> Human eyes respond to only a narrow range of wavelengths of electromagnetic waves— visible light. Differences in wavelength within that range are perceived as differences of color.											+	+					
<b>11B/M3:</b> Different models can be used to represent the same thing. What model to use depends on its purpose.						+	+										
<b>12D/M10:</b> Understand oral, written, or visual presentations that incorporate circle charts, bar and line graphs, two-way data tables, diagrams, and symbols.			+		+								+				
<b>1C/M1:</b> Important contributions to the advancement of science, mathematics, and technology have been made by different kinds of people, in different cultures, at different times.	+																

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<b>NSES Standards</b>																	
<b>Content Standard A (5-8): Abilities necessary to do scientific inquiry:</b>																	
a. Identify questions that can be answered through scientific investigations.				+													
c. Use appropriate tools to gather, analyze and interpret data.		+	+	+			+	+		+	+	+	+	+	+	+	+
d. Develop descriptions and explanations using evidence.		+	+	+			+	+		+	+	+	+	+		+	
e. Think critically and logically to make relationships between evidence and explanations		+	+	+	+	+	+	+	+		+	+	+	+	+	+	+
<b>Content Standard B (5-8), Physical Science:</b>																	
c. Transfer of energy: The Sun is a major source of energy for changes on the Earth's surface. The Sun loses energy by emitting light. A tiny fraction of that light reaches the Earth, transferring energy from the Sun to the Earth. The Sun's energy arrives as light with a range of wavelengths, consisting of visible light, infrared, and ultraviolet radiation											+	+					
<b>Content Standard D (5-8): Earth and Space Science</b>																	
a. Space Science; Earth's History: The Earth processes we see today, including erosion, movement of lithospheric composition, are similar to those that occurred in the past.		+	+	+													

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<b>Content Standard E (5-8): Science and Technology:</b>																	
b. Technology is essential to science, because it provides instruments and techniques that enable observations of objects and phenomena that are otherwise unobservable due to factors such as quantity, distance, location, size, and speed. Technology also provides tools for investigations, inquiry, and analysis.	+	+	+	+			+	+		+			+	+			
b. Technological solutions have intended benefits and unintended consequences. Some consequences can be predicted, others cannot.						+			+							+	
<b>Content Standard F (5-8): Science and Technology in Society:</b>																	
e. Science and technology have advanced through contributions of many different people, in different cultures, at different times in history.	+																
<b>Content Standard G (5-8): History and Nature of Science:</b>																	
c. In historical perspective, science has been practiced by different individuals in different cultures.	+																
<b>NRC Framework (K-12)</b>																	
<b>Dimension 1: Scientific and Engineering Practices:</b>																	
<b>Practice 1:</b> Asking Questions (for science) and Defining Problems (for engineering)		+		+	+	+	+	+		+			+	+	+	+	

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<b>Practice 2:</b> Developing and Using Models		+			+	+	+		+	+	+		+	+			
<b>Practice 5:</b> Using Mathematics and Computational Thinking		+				+			+	+							
<b>Practice 6:</b> Constructing Explanations and Designing Solutions	+	+	+	+		+	+	+		+			+	+			
<b>Practice 7:</b> Engaging in Argument from Evidence					+			+			+	+	+				
<b>Practice 8:</b> Obtaining, Evaluating, and Communicating Information	+		+		+	+	+	+	+		+	+	+		+	+	+
<b>Dimension 2: Crosscutting Concepts</b>																	
Systems and System Models	+	+				+											
Patterns	+			+		+		+		+	+						
Cause and Effect: Mechanism and Explanation Scale, Proportion, and Quality Stability and Change	+		+	+	+	+				+							
System and System Models								+						+			
<b>Dimension 3: Dicipinary Core Ideas Earth and Space Sciences:</b>																	
<b>ESS1:</b> Earth's Place in the Universe			+	+											+		
<b>ESS1.B:</b> Earth and the Solar System														+	+	+	+
<b>ESS1.C:</b> The History of Planet Earth		+	+	+													+
<b>21st Century Skills*</b>																	
<b>Learning and Innovation Skills</b>																	
a. Creativity and Innovation			+	+	+												

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b. Critical Thinking and Problem Solving			+	+	+												
c. Collaboration			+	+	+												
<b>Information, Media and Technology Literacy</b>																	
a. Information and Communication Technology (ICT) Literacy			+														
b. Flexibility and Adaptability			+														
<b>Life and Career Skills</b>																	
a. Social and Cross-Cultural Skills			+														
* Please Note: 21st Century Skills have been aligned for select lessons.																	